Article

# Rhythm, Code and The Machine: Evolution of Film Editing in the Era of Artificial Intelligence

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## Abstract

Film occupies a unique position in multimedia due to its ability to create emotion through editing. More than a mechanical process, editing serves as the structural and affective core of film language, shaping time, rhythm, and meaning. From early cross-cutting techniques to non-linear digital systems, technological developments have continually expanded its expressive potential. In the age of AI, editing is evolving through tools like automated scene detection, facial recognition, and first-cut generation, raising questions about authorship and creative control. Using a qualitative case-study approach, this article examines AI platforms such as Adobe Sensei, RunwayML, and Descript, alongside the AI-generated trailer for Morgan (2016). It situates AI-assisted film editing within media studies and film theory, examining the historical interplay between editing practice and technological advancement. It argues that AI does not replace human editors but redefines their role as hybrid practitioners, drawing on case studies of popular AI platforms and perspectives from cultural studies, human–computer interaction, and computational fluency. The analysis highlights a gap in research on montage, rhythm, and authorship in AI-driven editing, calling for a rethinking of editing as a human–machine collaboration.

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## Introduction

Film is one of the most influential forms of media and connects emotionally with audiences, occupying a unique position within visual culture. Even though it is one of the youngest art forms, it has been evolving both technically and aesthetically. For instance, the filmmaking pioneer George Méliès hand-painted the black-and-white film *A Trip to the Moon* to open a new possibility. Similarly, the introduction of synchronised sound in the 1929 film *The Jazz Singer*, the widespread adoption of colour films, the development of 3D technology, and the emergence of augmented reality demonstrate the medium's continuous evolution.

Film editing has consistently stood at the crossroads of aesthetics and technology. Editing is not merely the process of assembling footage; it shapes meaning, rhythm, and emotional resonance (Dancyger, 2011). In the era of the Soviet film school, filmmakers such as Sergei Eisenstein and Vsevolod Pudovkin theorized editing as the collision or juxtaposition of different shots to generate new meaning, a theory termed montage (Eisenstein, 1949; Pudovkin, 1958). On the other hand, in the Hollywood film school, filmmakers such as D.W. Griffith followed the concept of continuity and seamless narration. All these ideas were executed by physically cutting, splicing, and sticking the film, and this practice continued till the arrival of digital technology.

The emergence of digital technology once again reconfigured editorial practice. The introduction of non-linear editing (NLE) systems such as Avid Media Composer and Final Cut Pro provided editors with unprecedented flexibility, enabling instant rearrangement of footage and streamlined workflows. As a result, the amount of physical labour required in the post-production phase decreased significantly, transforming the editor's role from a technical assembler to a more creative decision-maker (Dancyger, 2011; Murch, 2001; Oldham, 1992; Ondaatje & Murch, 2002).

In the present moment, the integration of AI introduces new possibilities in editorial practices. The contemporary software is incorporating machine learning to recognise music beats, detect faces, and even generate additional footage with some prompts. Platforms such as Adobe Sensei and RunwayML embed algorithmic processes into editing practice, raising crucial questions regarding the balance between automation and human creativity. On one hand, AI may enhance creative freedom by automating repetitive technical tasks; in contrast, it risks diminishing the interpretive and affective dimensions traditionally associated with human editorial judgment. This article, therefore, interrogates the ever-evolving relationship between film editing and technological innovation, examines the specific affordances of AI-assisted tools, and theorises their implications for creative practice.

## Review of Literature

### Editing as Craft and Theory

Rather than being a simple technical procedure, film editing has historically been theorised as the source of cinematic meaning. Soviet filmmakers defined editing as an interpretive and active process. According to them, individual shots do not showcase the meaning in cinema. However, the meaning is created through their combination (Eisenstein, 1949; Pudovkin, 1958). By juxtaposing shots with contrasting meaning or emotion, Soviet filmmakers created new ideas and conveyed their ideology beyond what was shown visually. This understanding positions editing as the creative hub of filmmaking in which the filmmakers guide the audience to the proposed ideology and the cinematic meaning.

At the same time, Dziga Vertov (1984) proposed a new theoretical concept called “kino-eye” for film editing. For Vertov, the camera was not just a tool to shoot some shots, but an instrument that could show truths which cannot be seen by the human eye. By manipulating time, movement, and perspective through editing, the kino-eye sought to construct a new, objective vision of reality; one that reflected Vertov’s belief in cinema as a tool for social and ideological transformation (Vertov, 1984). Another Soviet filmmaker, Eisenstein (1949), conceptualised montage as a dialectical collision of images capable of providing intellectual and emotional insight. This idea shows how the Soviet film schools

viewed film editing. Rather than just arranging the shots, they believed editing was an active and interpretive process to guide the audience to understand a film. Both Eisenstein and Vertov saw editing as the creative agency which creates cinematic meaning and conveys political ideology. Their theories emphasised the editor's role as a meaning-maker rather than a technician and the process of editing as a space for artistic expression.

This focus diverges from the classical Hollywood approach, which prioritised continuity editing to maintain immersion via spatial and temporal coherence (Bordwell et al., 1985). Although not explicitly dialectical, Hollywood practices provided editors with considerable agency, as they were tasked with directing audience attention while maintaining narrative clarity. Throughout these traditions, editing was consistently characterised as an interpretive activity.

In the analogue era, editing was an intensely tactile and labour-intensive process. The film editor had to work for days to sort the shots, and the process involved heavy machinery such as Steenbeck and Moviola systems. The editor had to mark every single frame in order to cut. Even the cutting was purely physical. Which means the film was spliced using the sharp cutter in the machine and joined with adhesive. Once the arrangements of the shots of one reel are done, the editor goes to another reel. The craft demanded not only technical precision but also creative foresight. Even minor errors could be costly and physically demanding to correct (Dancyger, 2011). This meticulous process positioned the editor as both a technician and an artist, placing them at the core of creative authorship and responsibility in filmmaking. The analogue editing demanded enormous decision-making skill as well as patience, which are arguably diluted when the digital revolution started.

## The Digital Turn

Scholars have long sought to chart the technological evolution of film editing, how the introduction of new tools and the innovation of various techniques have reshaped the practice of film editing. Moreover, the changes happened to the role of the editor and the aesthetic perspective of the films themselves. The shift from analogue to digital technology is considered a turning point in the history of cinema. Oldham (1992) observes that the emergence of Non-Linear Editing (NLE) systems such as Avid, Adobe Premiere Pro, and Final Cut Pro

transformed the editing process by introducing flexibility and the ability to manipulate multiple timelines simultaneously. This revolutionised film editing by giving more freedom to editors to conduct further experimentation with the footage.

However, there has been an argument about whether this change enhanced or diminished the editorial agency. Rodowick (2009) cautions that the digital workflow, even though the new practice is efficient, it risks reducing the processes of an editor engaging with the material and embodied artistry that once defined analogue practice. While using the NLE software, editors do not engage with the footage physically as they did with films in the era of analogue. Similarly, Tryon (2019) put this discussion into the participatory culture. He notes how accessible applications like CapCut and iMovie have democratised the process of video editing. This democratised practice is giving rise to user-generated content on platforms such as YouTube and TikTok. He also argues that the NLE practice blurred professional boundaries and eroded traditional understandings of craftsmanship. When it comes to digital video editing, these scholars put forward the idea that technological change is not just technical. It also redefines the agency of creativity, transforms the way stories are told and ultimately determines how visual culture is produced, consumed, and valued.

## AI and Cultural Production

The arrival of AI tools in editing further deepened the concern. McCormack et al. (2019) argue that AI should be conceptualised as an autonomous contributor to cultural production; that is, AI is capable of making creative outputs and aesthetic decisions rather than a passive tool. Moreover, it can curate the cultural meanings from its outputs by influencing how content is interpreted and what it communicates to audiences. In this context, AI can participate in the creative sector by innovating new forms, patterns or even ideas that go beyond what humans directly intend. This outcome raises questions about the authenticity and authorship of the work. Manovich (2018) also backs this concern by suggesting that AI possesses distinctive stylistic signatures, “AI aesthetics,” comparable to human creativity. In the present creative practice, this observation has important implications for the concept of authorship and creative agency. According to this school of thought, craft and creativity cannot be viewed as only a human domain if the AI generates recognisable aesthetic patterns. Instead,

a shift towards a collaborative or hybrid production in which artistic authority and creative decision-making are partially delegated to machine learning. Argaw et al. (2022) provide a database that shows how machine learning models are handling tasks such as scene detection and beat alignment. Even though these models are doing this job with a greater degree of accuracy in the above scenario, they fail to replicate the emotional aspect of the visual narration. Gavran et al. (2025) similarly document progress in emotion recognition and automated assembly, but caution that algorithmic decisions introduce risks of bias and opacity, particularly when applied to affective or narrative dimensions. This scenario reinforces the claim that editors remain indispensable, not despite but because of AI's limitations in capturing affective nuance.

## Research Gap

Even though the literature on AI and creativity is expanding, there remains limited engagement with how AI redefines the fundamentals of film, such as montage, pace of emotional narration, and authorship. AI does not just reproduce established cinematic methods. It introduces new aesthetics that could challenge traditional understandings of creative control and narrative rhythm. The rise of AI necessitates a theoretical re-evaluation of concepts once assumed to be exclusively human. The research, such as Argaw et al. (2022) and Gavran et al. (2025), provides technical insights and the presence of a human mind, respectively. That is how human reasoning, intention, and interpretation continue to shape the way in which technological systems are developed and used. In this sense, AI is still grounded in human thought and agency. However, few studies connect these ideas to the broader history of editing theory. Along with the technical advancement, these theories and concepts have not addressed how the AI editorial agency fits into the current narrative of film studies. To address this gap, this study employs a targeted methodological approach, analyzing real-world applications of AI to understand its practical and theoretical impact on the editorial craft.

## Research Methodology

### Research Design

This study employs a qualitative, exploratory research design to examine the evolving role of the film editor in the era of Artificial Intelligence. To bridge the gap between theoretical film studies and contemporary technological practices, the research adopts a multiple-case study approach, situated within a multidisciplinary theoretical framework.

### Case Study Selection

The case study method was selected to provide practical, real-world grounding for the theoretical discussions of AI in post-production. The analysis focuses on two distinct categories of cases to illustrate different facets of AI integration:

- Contemporary AI Platforms: The study analyzes the affordances of widely adopted AI-assisted editing tools, specifically Adobe Sensei, RunwayML, and Descript. These platforms were chosen because they represent the current spectrum of AI integration, from automated background database managem ent to generative, prompt-based audiovisual manipulation. Social media alg orithms (TikTok and Instagram) are also briefly examined to illustrate the de mocratization of rhythmic editing.

- Applied Hybrid Editing: To examine the practical workflow and limitations of human-machine collaboration, the research critically evaluates the creation of the 2016 trailer for the film *Morgan*, which utilized IBM's Watson. This specific case was selected as a definitive, foundational example of algorithmic selection paired with human editorial assembly and narrative oversight.

## Theoretical Framework

The analysis of these case studies is guided by a framework drawing from film theory, cultural studies, and human–computer interaction:

- Historical Film Theory: The study uses historical frameworks—specifically Soviet montage theory (Eisenstein and Vertov) and classical Hollywood

continuity—as a comparative baseline. This historical lens is used to evaluate how AI either disrupts or aligns with traditional understandings of cinematic meaning-making, pacing, and narrative rhythm.

- Computational Authorship: To analyse the creative agency of AI, the research incorporates contemporary media theories regarding algorithmic aesthetics, bias, and autonomous cultural production.

By applying this theoretical framework to the selected case studies, the methodology facilitates a critical synthesis of how AI systems reconfigure editorial authorship. This approach allows for a nuanced evaluation of the shift toward a necessary hybrid editorial model. Guided by this framework, the following analysis examines the practical integration of AI tools and the broader theoretical implications of algorithmic agency.

## Analysis and Discussion

### The Emergence of the Hybrid Editorial Model

AI has transcended theoretical speculation to become deeply embedded within professional editing pipelines across commercial and creative domains. Rather than merely functioning as a mechanical update, AI-driven tools—such as automated colour grading, speech-to-text transcription, and intelligent scene detection—are reconfiguring the very core of post-production workflows. This integration necessitates a re-evaluation of how cinematic meaning is constructed when the labour is shared between human intuition and algorithmic logic. This synthesis between artificial intelligence and future storytelling suggests a fundamental shift in how cinematic narratives are conceived and constructed (Erdem, 2025).

### Computational Rhythm and the Persistence of Montage

The art of editing has historically been understood through the lens of rhythm, where the interplay of pacing and silence shapes emotional engagement. Contemporary platforms like Adobe Sensei and various beat alignment tools now emulate this process by analysing tempo, amplitude, and frequency variation to

determine cut points. In this framework, rhythm becomes computationally quantifiable.

However, a synthesized analysis reveals that algorithmic precision does not fully account for affective or symbolic nuance. While Adobe Sensei can autonomously perform scene detection or segment clips based on data thresholds , it lacks the interpretive awareness inherent in Kuleshov's montage theory. As Kuleshov demonstrated, the meaning of a shot is derived not from its internal data, but from its juxtaposition with other images—an associative process that depends on human interpretive anticipation. Thus, while AI effectively reproduces quantifiable rhythm, the 'affective weight' of editorial timing remains grounded in human intuition, requiring the editor to serve as an evaluative correction to algorithmic miscalculations.

**Generative Labor and Distributed Authorship**

The integration of generative tools like RunwayML and Descript further complicates established notions of authorship. RunwayML automates precision-heavy tasks such as rotoscoping and background removal, while Descript enables transcription-based cuts and generative audiovisual manipulation. When these systems propose rough cuts or generate content based on prompts, editorial agency becomes distributed between the user and the machine.

This shift suggests that 'supervision' itself has become a new form of authorship. The editor's role has transformed from manual execution to critical evaluation, ensuring narrative coherence and emotional resonance. As Manovich (2018) argues, AI is not a neutral instrument but a cultural actor with its own aesthetic imprint. Consequently, a hybrid theoretical model is required—one that recognizes that while generative tools may reduce the physical 'heavy lifting' of the post-production pipeline, the interpretive labour of the editor persists, albeit in a reconfigured state.

**Ethical Landscapes and Pedagogical Shifts**

The democratization of these tools on social media platforms like TikTok and Instagram—which deploy algorithm-based presets for rhythmic transitions—

reinforces the global reach of AI aesthetics. However, this automation brings significant ethical and cultural concerns. Because AI systems are trained on culturally situated datasets, there is a risk that they may reproduce Western narrative norms, reinforcing global hierarchies in cinematic form. Furthermore, the rise of voice cloning and deepfake editing necessitates new ethical frameworks to safeguard authenticity. The emergence of deepfakes presents a looming challenge not only for cinematic authenticity but also for broader privacy and national security (Chesney & Citron, 2019).

These shifts carry profound implications for media education. Mastery in the contemporary era involves more than just cinematic language; it requires 'computational awareness'. Film schools must move beyond traditional montage theory and software mechanics to cultivate hybrid practitioners who can leverage AI's efficiencies while critically interrogating its cultural and ethical limitations. Furthermore, collaborating with generative AI necessitates a critical re-evaluation of journalism and media education to prepare students for these algorithmic implications (Pavlik, 2023).

## Case Study: The *Morgan* Trailer as a Hybrid Blueprint

The most definitive example of this hybrid partnership is the 2016 trailer for the film *Morgan* (Smith et al., 2017). Using IBM's Watson to analyse 90 minutes of footage, the AI identified key moments of suspense in just 24 hours—a task that would typically take human editors weeks. However, the AI did not have the 'final cut'. A human filmmaker was required to sequence those moments, notably discarding one of the AI's suggestions because it did not fit the desired human-driven narrative arc.

The *Morgan* case demonstrates that AI is unmatched in the 'efficiency of selection,' but the human editor remains essential for 'narrative assembly and creative oversight' (Smith et al., 2017). This synthesis confirms that the most effective framework for the future of cinema is not a replacement of the editor, but a collaborative partnership. In this hybrid model, AI handles repetitive, data-intensive labour—such as aligning shots or basic colour correction—while the responsibility for emotional coherence and artistic decision-making remains firmly with the human editor.

## Conclusion

The integration of AI into the world of film, especially in film editing, marks a crucial moment in the vast history of this art form. Film editing constantly evolved with respect to the technology, for example, from rigid analogue moviola to flexible digital NLE systems. Each such change redefined the role of the editor as well, without removing the creative agency the editor brings to the table. The arrival of AI intensifies the change by introducing algorithm-based tools into the editing practices and also challenging the fundamentals of the traditional established film theories as well.

Rather than removing the human creativity, the AI-assisted editing workflow highlights a new beginning as a hybrid practice. Editors are working as both creators of the cinematic language and supervisors of the AI-assisted computational systems in the new era. Editors are now responsible for driving the AI-assisted output into the existing narrative of the film culture. This phenomenon illustrates that the machine can do all the heavy labour in the post-production pipeline, which traditionally needed much human effort; the creative decision-making and narrating the emotion still fall on the shoulders of the editor.

It is also ever so relevant to keep an eye on the ethical considerations, pedagogical reform, and global disparities that AI brings with it. The risk of adapting to cultural differences while losing authenticity requires careful examination, even in the midst of technological excitement. It is only through the creative judgment of a human editor that we can prevent machines from diluting artistic expression or reinforcing existing aesthetic hierarchies.

At the end of the day, the future of editing does not lie entirely in human or machine, but in their co-creative partnership. The existing traditional film theories must evolve to understand AI not just as a neutral tool but as an active partner in the editorial agency. AI expands the boundary of cinematic editorial expression with a creative, critical human at its driving seat.

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